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(54) Toy car remote control device

Fernsteuerung für Spielzeugautos

Dispositif de télécommande pour voitures jouet

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Description

FIELD OF THE INVENTION

The invention relates to a remote control device for toy cars. More particularly, it relates to a remote control device which uses radio signals to control the toy's electrically powered functions.

DESCRIPTION OF THE PRIOR ART

Toy car radio remote control devices already exist and can be either complex or simple and cheap. However, the performance of the second category is often poor and they sometimes generate spurious commands. This is particularly true, for example, when:

- the transmitter has been switched off but the receiver in the toy car has been left on: some of the toy's functions may be activated by spurious interference received by the receiver.
- the transmitting and receiving antennas physically touch each other and generate spurious interference.
- the receiving antenna comes into contact with metal objects.
- somebody physically touches the receiving antenna.

Even complex toy car remote control devices may suffer undesired effects due to these accidental situations.

For example, the document EP-019.448 discloses an apparatus and a method for controlling the speed and direction of a toy vehicle by radio. This vehicle comprises two motors respectively connected to separate drive wheels, the speed and direction of the vehicle being proportional to the relative speeds of the motors. The apparatus includes transmitting and receiving means, such that a desired movement is produced by determining the speeds of the motors, encoding them onto a transmitted signal, decoding them by the receiving means and applying them to the motors.

Document EP-019.448 does not present efficient remedies to the spurious effects stated above.

US patent 4.390.877 describes a remote control system in which control signals from a transmitter are sent to receivers mounted in a number of vehicles. Manually operated controllers for the respective vehicles are connected to the transmitter. The data transmission system processes control signals into successive words, which permit the individual vehicles to be controlled by their individual controllers indepently of one another. Each word of a control signal is preceded by a synchronizing bit, and is shared into several successive channels which correspond to the operating controllers.

The latter device is well adapted for the simultaneous control of several vehicles driven along given tracks. Otherwise, it may by subjected to various spurious effects like those precedently described.

US patent 4.334.221 deals with a radio control system for a multi-controller, multi-vehicle, independently controlled toy vehicle system. The radio control system provides proportional steering and speed control, each of a plurality of control sets respectively transmitting low-duty cycle command bursts containing an identity code and steering and speed commands. The control sets transmit their command bursts asynchronously, so that the probability of interference between several control sets is considerably decreased. Moreover, command bursts which are not correct in every respect, due to noise or interference between control sets, are ignored and the previously stored commands continue to be executed.

The previous precautionary measures address concurrent simultaneous bursts. However, they are not specifically directed to circumstances like those formerly stated, except through non-reaction of the vehicles to unrecognized command bursts.

SUMMARY OF THE INVENTION

Some objects of the invention are to provide an inexpensive, reliable toy car remote control device for controlling the electrically powered functions of a toy car.

Further objects of the invention are to provide such a device that overcomes the drawbacks associated with technology devices as listed above.

In its basic form, the invention comprises a transmitter that transmits a radio signal, and a receiver that receives the said signal and controls the functions of the car, able to store a reference identification code.

The signal is a digital waveform composed of serial data organized within a time frame.

The time frame comprises an identification code pulse, or ID code pulse, intented to be compared with the reference identification code followed by control code pulses, each control pulse controlling a function of the toy car.

The receiver only processes the control code pulses if it detects the identification code pulse preceding them.

The toy car remote control device is characterized in that the receiver is able to store a first and a second reference identification codes and that the time frame comprises successively a first and a second ID code pulses, both ID code pulses being detected successively and independently. The receiver comprises clock capacities which provide synchronising signals from the reception of the first ID code pulse. It comprises also enabling capacities which enable the detection of the second ID code pulse only if the second ID code pulse has been received within a given time measured through said synchronising signals form the detection of the first ID code pulse and resetting the detection process otherwise. At last, the receiver comprises activating means, which activate the detection of the control code

pulses only if both ID code pulses have been detected.

Spurious interference detected by the receiver is unlikely to be structured in the same way as the signal sent by the transmitter and so there is no risk of the receiver interpreting such interference as a radio control signal sent by the transmitter.

In various embodiments of the invention, the toy car remote control device will have the following features either separately or several together:

- the functions of the toy car are a direction control, a speed function and a steering control;
- the value produced by at least one of the control pulses controlling a function of the toy car depends on the duration of the control pulse;
- any spike or noise with duration less than 0.25 ms will be filtered out by interval digital filter;
- the receiver comprises a built-in tone amplifier with closed loop gain, a means for clamping the level of the code pulses and a decoder;
- the decoder comprises at least one pulse width comparator;
- the decoder comprises several pulse width comparators, each one corresponding to a specific code pulse, together with a clock demultiplexer which enables the respective pulse width comparator at the instant its corresponding code is available;
- the decoder comprises several latches, each one corresponding to a code pulse, and which are triggered by the respective pulse width comparator to control an output, each output being protected against cross-conducting by Nand gates;
- the receiver comprises a light-emitting diode that flashes when no signal is being received by the receiver.

BRIEF DESCRIPTION OF THE FIGURES

Figure 1 is a representation of the data waveform.

Figure 2 is a block diagram of the receiver of the invention.

Figures 3 and 4 are schematic diagrams of the data decoder of the invention.

Figure 5 is a timing diagram showing how the invention functions.

Figure 6 is a flow chart of the operations performed.

DETAILED DESCRIPTION

The invention relates to a toy car remote control device.

It comprises a transmitter and a receiver. The transmitter sends a radio signal that the receiver receives and uses to control the car's functions.

These functions are usually electrically powered functions such as direction control (forward or reverse), steering (left or right) and turbo (acceleration in speed).

The signal transmitted by the transmitter is represented in Figure 1. It is a digital waveform comprising serial data codes 1-5 organized with a time frame 6.

This time frame 6 is regularly repeated whenever any control key of transmitter is pressed, the duration of each frame ranging from 15 to 20ms.

The first two pulses 1,2 of each frame are ID code pulses. The duration of these ID code pulses is fixed at 4ms each, for example.

The third pulse 3 is the direction control code pulse that the receiver interprets according to the width or duration of the said pulse. A narrow direction code pulse is interpreted as "forward" and a wide direction code pulse as "reverse".

The fourth pulse is the turbo code pulse. It is interpreted on the basis of being present or absent in the time frame. When the turbo code pulse is present, this means that the turbo function is to be activated, and when the said pulse is absent, this means that the turbo function is to be deactivated.

The fifth and last pulse 5 is the steering code pulse. Like the direction code pulse, the steering code pulse is interpreted on the basis of its width or duration. For a narrow steering code pulse, the steering actuator must steer the car to the left, and for a wide steering code pulse, the steering actuator must steer the car to the right. When no steering code pulse is present in the time frame, the steering actuator must keep the steering centralized.

The width of a narrow direction or steering code pulse is 0.5ms and that of a wide direction or steering code pulse 2ms.

The width of the turbo code when present in the frame is 0.5ms.

The two ID code pulses are separated by a time interval 7 of 0.5ms, with a time interval 8 of 1.5ms separating the second ID code pulse and the first control code pulse.

Successive frames are separated by a free time interval of approximately 2ms.

A block diagram of the receiver carried by the toy car is shown in Figure 2. The receiver provides the control signal for each of the car's electrically powered functions on a separate output.

The RF signal is received by antenna 10. Output pins 11 to 16 each correspond to a value of a function of the car to be activated.

The signal received by antenna 10 passes through the RF front-end circuit 17 to input pin 18. The signal is then fed to a built-in tone amplifier 19 providing a closed loop gain of 60dB. Tone amplifier 19 provides a constant maximum level digital signal at point 20 therefore mitigating the effects of any variation in received signal strength.

The signal at the output of amplifier 19 is also sampled by LED driver 22. LED driver 22 makes LED 66 flash whenever there is no output signal from amplifier 19, and stops it flashing as soon as a signal reappears on the output of amplifier 19.

This is particularly useful for providing a visual indication of the car being out of remote control range.

A synchronized astable timer 23 provides a string of 0.25ms clock pulse signals which control two timers 24, 25.

These 0.25ms clock pulses are also applied to a pulse width comparator operating as a digital filter 30 to reject any spike and noise before performing data decode.

First timer 24 together with pulse comparator 26, first ID detector 27 and second ID detector 28 allow the receiver to recognize that the received signal is a valid signal and not spurious interference.

For a valid signal, second timer 25 activates clock demultiplexer 29. Clock demultiplexer 29 has seven outputs, each corresponding to a value of one of the control pulses.

Each of these outputs 32 to 36 is connected to a corresponding decoder 42-46, or pulse width comparator, that also receives the data from the signal. On decoding the data, decoder 42-46 operates a drive latch 52-56 that is connected to a corresponding output pin 12-16.

Output pin 11 corresponds to the "centre" steering code which is automatically selected in the absence of a "left" or "right" steering code pulse in the received signal frame.

Protection circuits 61 and 62 are provided between the drive latches for direction and steering to protect against cross-conducting.

In concern of system integration into a chip with pin limited, it is preferrable to monitor performance of digital signal after passed amplifier 19, schmitt trigger 21, and digital filter 30. In order to be measured the signal at pin 11, just biased pin 63 to supply voltage. At normal condition, switch 63 is always connected to left and right latch through a logical circuit 65.

Figures 3 and 4 propose detailed practical circuit diagrams of the functions represented on the block diagram in Figure 2.

The signals transmitting the serial codes from the transmitter are received and fed to "Data In" pin 18. The pulses are then shaped by Schmitt-triggered circuit 101 which comprises two Quad 2-Input Schmitt-triggered Nand Gates 102, 103. One shot timer 104 is a Monostable Multivibrator which generates a 3.8ms pulse on each positive-going transition of the data codes.

This pulse is sent through circuit 105 to ID detector 108.

Circuit 105 comprises two Quad 2-Input Schmitt-triggered Nand Gates 106, 107. ID detector 108 is a Dual J-K Flip-Flop with Clear.

The operation of astable timer 23 is synchronized at falling edge of output from detector 108 to provide a string of 0.25ms clock pulses.

If the second ID code pulse is detected before or on the fourth clock pulse available, a first ID detector 27 will be toggled and enable the second ID detector 28.

However, if the second ID code pulse has not been received before or on the fourth clock pulse, ID detector 27 will be reset automatically on the fifth clock pulse.

The process for the second ID detector 28 is the same as that for the first ID detector 27 except that second ID detector 28 enables a four-bit ring counter 116-125 and first ID detector 27 enables a three-bit ring counter 110-115.

Clock demultiplexer 29 is synchronized by astable timer 23, and is activated by a signal received from the second ID detector 28 through Quad 2-Input Nand Gate 109 together with Hex Inverter 130 and 131.

Clock demultiplexer 29 and its associated components 116-125 produce five clock signals.

Each clock signal, respectively 202, 203, 204, 205 and 206, supplied by clock demultiplexer 29 is correctly timed to coincide with one of the control code values. It is directed to a pulse width comparator 302-306 which receives the signal's digital data via filter 30 and can send a signal to drive latches 402-406 which in turn send a signal to output pin 12-16. The pulse width comparators each comprise a Dual J-K Flip-Flop with Clear, each receiving data signals on the clock pulses.

The drive latches each comprise two Quad 2-Input Nand Gates in combination with two Quad 2-Input Nor Gates.

Many different components can be used to put the invention into practice, however when using those from the applicant (SGS-THOMSON firm), the following numbered components can be used :

- as Quad 2-Input Schmitt Nand Gate 102, 103, 106, 107 : HC 132,
- as Dual J-K Flip-Flop with Clear 27, 28, 108, 110, 111, 114, 116, 117, 120, 123 : HC 73,
- as Dual Precision Monostable Multivibrator 23 : 4538,
- as Quad 2-Input Nand Gate 109, 118, 121, 124, 422, 423, 424, 425, 426 : HC 00,
- as Quad 2-Input Nand Gate 412, 413, 414, 415, 416 : HC 08,
- as Hex Inverter 119, 122, 125, 126, 130, 131 : HC 04,
- as Triple 3-Input Gate 112, 113, 115 : HC 10,
- as Astable Timer 23 : NE 555,
- as Clock Demultiplexer : HC 237,
- as Digital Filter 30 : HC 73.

Figure 5 shows the timing diagram of some of the most important signals in the receiver.

701 is the input signal, as already represented and described in Figure 1.

702 is the signal produced by astable timer 23 in response to the first ID code pulse.

704-709 are the signals produced by the clock demultiplexer, respectively on each of its outputs.

The operation of the device will now be described with reference to the flow chart in Figure 6.

First, when power is connected to the receiver, all functions are reset (601).

Data codes are then detected by the receiver (602).

The signals are amplified (603) to provide a maxi-

mum constant level and then shaped by a Schmitt-triggered circuit (604).

The first pulse operates the one-shot multivibrator (605) that performs the ID code pulse comparison (606).

The first ID code pulse is detected (607) and its positive-going edge brings the three-bit ring counter (608) into operation.

If the second ID code pulse is detected before or on the fourth clock pulse (609), the first ID detector will be toggled, enabling in turn the second ID detector (610).

However, if the second ID code pulse has not been received before or on the fourth clock pulse, ID detector 27 will be reset automatically on the fifth clock pulse.

The second ID code pulse is detected in the same way as the first ID code pulse (610-613), except that the ring counter is a four-bit ring counter (611).

When the first and the second ID code pulses are correctly detected, five separate clock pulses will be generated by the clock demultiplexer (29). These clock pulses will be used to control corresponding pulse detectors together with incoming digital signal for each of the control functions.

After detection, each pulse activates a latch that operates the corresponding function.

Claims

1. Toy car remote control device, the said toy car having electrically powered functions including:

   - a transmitter which transmits a radio signal and,
   - a receiver which receives the said signal and controls the functions of the car, able to store a reference identification code,
   - the said signal being a digital waveform composed of serial data (1-5) organized within a time frame (6), said time frame (6) comprising an identification code pulse (1, 2) or ID code pulse intended to be compared with the reference identification code, followed by control code pulses (3-5), each control pulse controlling a function of the toy car, and the receiver only processing the control code pulses if it detects the identification code pulse (1, 2) preceding them, characterized in that the receiver is able to store a first and a second reference identification codes and that said time frame (6) comprises successively a first (1) and a second (2) ID code pulses, both ID code pulses being detected successively and independently, the receiver comprising clock capacities (23) which provide synchronizing signals (702) from the reception of the first ID code pulse (1), enabling capacities (27) which enable the detection of the second ID code pulse (2) only if the second ID code pulse (2) has been received within a given time measured through said synchronizing signals from the detection of the first ID code pulse (1), and resetting the detection process otherwise, and activating means (23, 28, 29), which activate the detection of the control code pulses (3-5) only if both ID code pulses (1, 2) have been detected.

2. Toy car remote control device according to claim 1, characterized in that it comprises an internal digital filter 30 to reject any spike or noise from the signal.

3. Toy car remote control device according to any of claims 1 and 2, characterized in that it comprises an amplifier 19 and a schmitt trigger 21 processing the signal before decoding.

4. Toy car remote control device according to any of claims 1 to 3, characterized in that the functions of the toy car are a direction control, a speed function and a steering control.

5. Toy car remote control device according to any of claims 1 to 4, characterized in that the value produced by at least one of the control pulses (3,5) controlling a function of the toy car depends on the duration of the control pulse.

6. Toy car remote control device according to any of claims 1 to 5, characterized in that the receiver comprises a built-in tome amplifier (19) with closed loop gain, a means for clamping the level of the code pulses and a decoder.

7. Toy car remote control devices according to claim 6, characterized in that the decoder comprises at least one pulse width comparator (42-46).

8. Toy car remote control device according to any of claims 6 and 7, characterized in that the decoder comprises several pulse width comparators (42-6), each one corresponding to a specific code pulse (29), together with a clock demultiplexer which enables the respective pulse width comparator (42-46) at the instant its corresponding code is available.

9. Toy car remote control device according to any of claims 6 to 8, characterized in that the decoder comprises several latches (52-56), each one corresponding to a code pulse, and which are triggered by the respective pulse width comparator to control an output.

10. Toy car remote control device according to claim 9, characterized in that it comprises Nand gates (61, 62) that protect each output against cross-conducting.

11. Toy car remote control device according to any of claims 1 to 10, characterized in that the receiver

comprises a light-emitting diode 66 that flashes when no signal is being received by the receiver.

Patentansprüche

1. Fernsteuerungsvorrichtung für Spielzeugautos mit elektrisch betriebenen Funktionen mit:

   einem Sender, der ein Funksignal sendet, und

   einem Empfänger, der das Signal empfängt und die Funktionen des Autos steuert, und in der Lage ist, einen Referenz-Identifikationscode zu speichern,

   wobei das Signal eine digitale Wellenform aus in einem Zeitrahmen (6) organisierten seriellen Daten (1-5) ist, wobei der Zeitrahmen (6) einen Identifikationscodeimpuls (1, 2) oder ID-Codeimpuls aufweist, der mit dem Referenz-Identifikationsimpuls verglichen werden soll, gefolgt von Steuercodeimpulsen (3-5), wobei jeder Steuerimpuls eine Funktion des Spielzeugautos steuert, und der Empfänger die Steuercodeimpulse nur verarbeitet, wenn er die diesen vorausgehenden Identifikationsimpulse (1, 2) erkennt,

   dadurch gekennzeichnet, daß

   der Empfänger in der Lage ist, einen ersten und einen zweiten Referenz-Identifikationscode zu speichern, und daß der Zeitrahmen (6) aufeinanderfolgend einen ersten (1) und einen zweiten ID-Codeimpuls (2) aufweist, wobei beide ID-Codeimpulse nacheinander und unabhängig voneinander erkannt werden, wobei der Empfänger aufweist: Taktkapazitäten (23), die Synchronisiersignale (702) vom Empfang des ersten ID-Codeimpulses (1) an liefern, Freigabekapazitäten (27), die das Erkennen des zweiten ID-Codeimpulses (2) nur freigeben, wenn der zweite ID-Codeimpuls (2) innerhalb einer gegebenen, durch die Synchronisiersignale von der Erkennung des ersten ID-Codeimpulses (1) an gemessenen Zeitspanne empfangen wurde, und die den Erkennungsvorgang andernfalls zurücksetzen, und eine Aktivierungseinrichtung (23, 28, 29), die die Erkennung der Steuercodeimpulse (3-5) nur aktiviert, wenn beide ID-Codeimpulse (1, 2) erkannt wurden.

2. Fernsteuerungsvorrichtung nach Anspruch 1, dadurch gekennzeichnet, daß sie ein digitales internes Filter (30) zum Unterdrücken jeglicher Spitzen und jeglichen Rauschens aus dem Signal vorgesehen ist.

3. Fernsteuerungsvorrichtung nach einem der Ansprüche 1 oder 2, dadurch gekennzeichnet, daß sie einen Verstärker (19) und einen Schmitt-Trigger (21) aufweist, die das Signal vor dem Dekodieren bearbeiten.

4. Fernsteuerungsvorrichtung nach einem der Ansprüche 1 bis 3, dadurch gekennzeichnet, daß die Funktionen des Spielzeugautos eine Richtungssteuerung, eine Geschwindigkeitsfunktion und eine Lenksteuerung sind.

5. Fernsteuerungsvorrichtung nach einem der Ansprüche 1 bis 4, dadurch gekennzeichnet, daß der von wenigstens einem der Steuerimpulse (3,5), die eine der Funktionen des Spielzeugautos steuern, erzeugt Wert, von der Dauer des Steuerimpulses abhängt.

6. Fernsteuerungsvorrichtung nach einem der Ansprüche 1 bis 5, dadurch gekennzeichnet, daß der Empfänger einen eingebauten Tonverstärker (19) mit geschlossener Schleifenverstärkung, eine Einrichtung zum Klemmen des Pegels der Codeimpulse und einen Dekodierer aufweist.

7. Fernsteuerungsvorrichtung nach Anspruch 6, dadurch gekennzeichnet, daß der Dekodierer wenigstens einen Impulsbreitenkomparator (42-46) aufweist.

8. Fernsteuerungsvorrichtung nach einem der Ansprüche 6 und 7, dadurch gekennzeichnet, daß der Dekodierer mehrere Impulsbreitenkomparatoren (42-46), wobei jeder einem spezifischen Codeimpuls entspricht, zusammen mit einem Taktdemultiplexer (29), der den jeweiligen Impulsbreitenkomparator (42-46) in dem Moment freigibt, in dem der entsprechende Code verfügbar ist.

9. Fernsteuerungsvorrichtung nach einem der Ansprüche 6 bis 8, dadurch gekennzeichnet, daß der Dekoder mehrere Haltespeicher (52-56) aufweist, von denen jeder einem Codeimpuls entspricht, und die durch den jeweiligen Impulsbreitenkomparator zum Steuern eines Ausgangs getriggert werden.

10. Fernsteuerungsvorrichtung nach Anspruch 9, dadurch gekennzeichnet, daß sie NAND-Gatter (61, 62) aufweist, die jeden Ausgang vor Kreuzleitung schützen.

11. Fernsteuerungsvorrichtung nach einem der Ansprüche 1 bis 10, dadurch gekennzeichnet, daß der Empfänger eine Licht emittierende Diode (66) aufweist, die blinkt, wenn der Empfänger kein Signal empfängt.

Revendications

1. Dispositif de télécommande pour voiture jouet, ladite voiture jouet ayant des fonctions alimentées électriquement comprenant :

   - un émetteur qui émet un signal radio et,
   - un récepteur qui reçoit ledit signal et commande les fonctions de la voiture apte à emmagasiner un code d'identification de référence,
   - ledit signal étant une forme d'onde numérique constituée de données en série (1-5) organisées dans un cadre temporel (6), ledit cadre temporel (6) comprenant une impulsion de code d'identification (1, 2) ou impulsion de code ID destinée à être comparée avec le code d'identification de référence, suivie par des impulsions de code de commande (3-5), chaque impulsion de commande commandant une fonction de la voiture jouet et le récepteur traitant seulement les impulsions de code de commande s'il détecte l'impulsion de code d'identification (1, 2) qui les précède, caractérisé en ce que le récepteur est apte à emmagasiner un premier et un deuxième codes d'identification de référence et en ce que ledit cadre temporel (6) comprend successivement une première (1) et une deuxième (2) impulsions de code ID, les deux impulsions de code ID étant détectées successivement et indépendamment, le récepteur comprenant des capacités d'horloge (23) qui fournissent des signaux de synchronisation (702) à partir de la réception de la première impulsion de code ID (1), validant les capacités (27) qui valident la détection de la deuxième impulsion de code ID (2) seulement si la deuxième impulsion de code ID (2) a été reçue dans une durée donnée mesurée par l'intermédiaire desdits signaux de synchronisation à partir de la détection de la première impulsion de code ID (1), et remettant à l'état initial le processus de détection autrement, et des moyens d'activation (23, 28, 29) qui activent la détection des impulsions de code de commande (3-5) seulement si les deux impulsions de code ID (1, 2) ont été détectées.

2. Dispositif de télécommande pour voiture jouet selon la revendication 1, caractérisé en ce qu'il comprend un filtre numérique interne 30 pour rejeter du signal toute pointe ou bruit.

3. Dispositif de télécommande pour voitures jouet selon l'une des revendications 1 et 2, caractérisé en ce qu'il comprend un amplificateur (19) et une bascule de Schmitt (21) traitant le signal avant le décodage.

4. Dispositif de télécommande pour voiture jouet selon l'une quelconque des revendications 1 à 3, caractérisé en ce que les fonctions de la voiture jouet sont une commande de direction, une commande de fonction de vitesse et une commande de braquage.

5. Dispositif de télécommande pour voiture jouet selon l'une quelconque des revendications 1 à 4, caractérisé en ce que la valeur produite par au moins l'une des impulsions de commande (3, 5) commandant une fonction de la voiture jouet dépend de la durée de l'impulsion de commande.

6. Dispositif de télécommande pour voiture jouet selon l'une quelconque des revendications 1 à 5, caractérisé en ce que le récepteur comprend un amplificateur de son intégré (19) avec un gain de boucle fermée, un moyen pour verrouiller le niveau des impulsions de code et un décodeur.

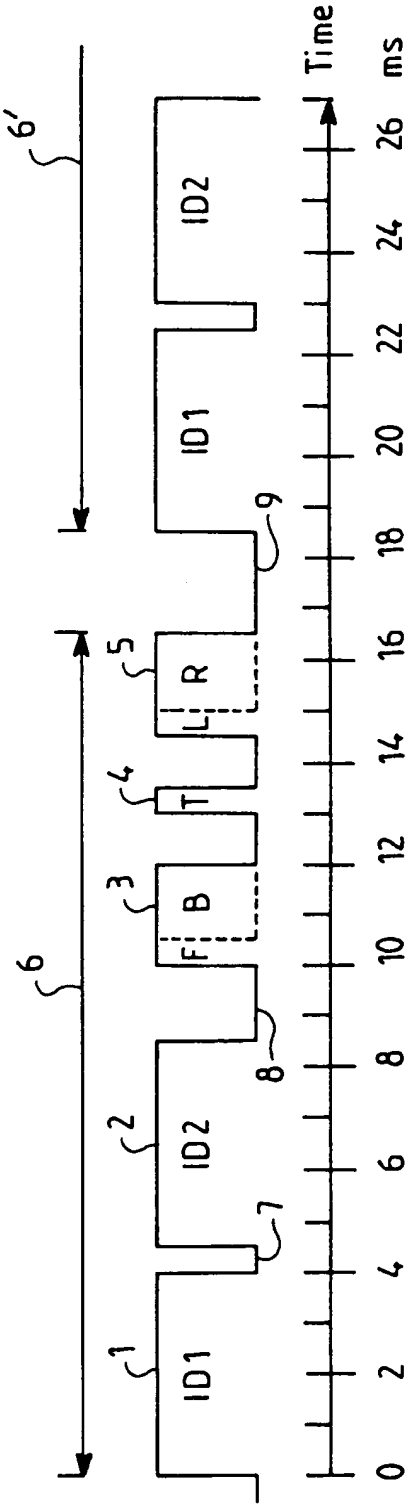
7. Dispositif de télécommande pour voiture jouet selon la revendication 6, caractérisé en ce que le décodeur comprend au moins un comparateur de largeur d'impulsion (42-46).

8. Dispositif de télécommande pour voiture jouet selon l'une quelconque des revendications 6 et 7, caractérisé en ce que le décodeur comprend plusieurs comparateurs de largeur d'impulsion (42-46), chacun correspondant à une impulsion de code, et un démultiplexeur d'horloge (29) qui valide respectivement chacun des comparateurs de largeur d'impulsion (42-46) à l'instant où son code correspondant est disponible.

9. Dispositif de télécommande pour voiture jouet selon l'une quelconque des revendications 6 à 8, caractérisé en ce que le décodeur comprend plusieurs verrous (52-56) chacun correspondant à une impulsion de code, et qui sont déclenchés par le comparateur de largeur d'impulsion respectif pour commander une sortie.

10. Dispositif de télécommande pour voiture jouet selon la revendication 9, caractérisé en ce qu'il comprend des portes NON-ET (61, 62) qui protègent chaque sortie contre une conduction transversale.

11. Dispositif de télécommande pour voiture jouet selon l'une quelconque des revendications 1 à 10, caractérisé en ce que le récepteur comprend une diode émettrice de lumière 66 qui émet de la lumière lorsqu'aucun signal n'est reçu par le récepteur.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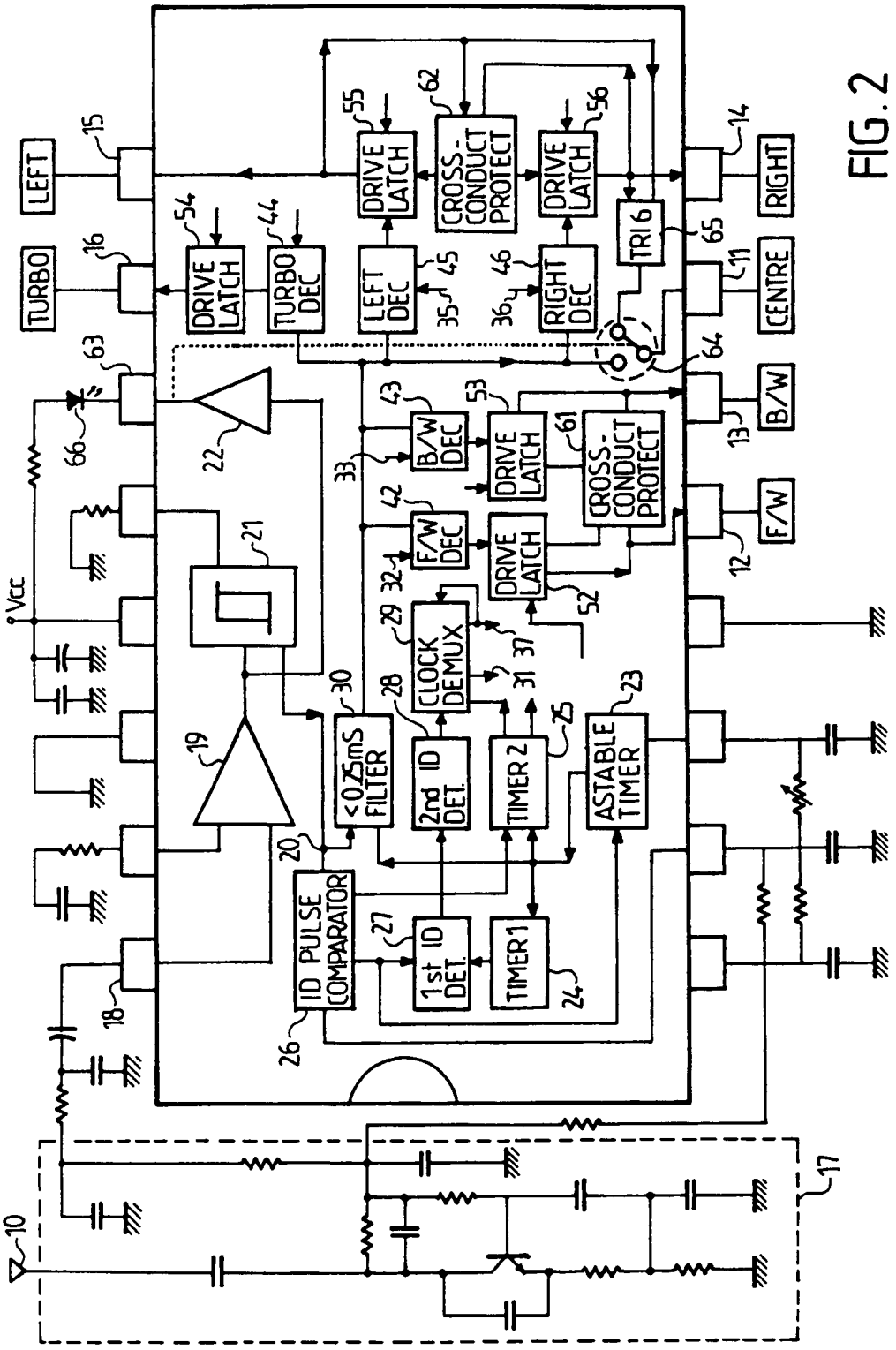
2
4
6
8
10
12
14
16
18
20
22
24
26
ID1
ID2
ID2
ID1
F
B
T
L
R
1
2
3
4
5
6
6'
7
8
9

FIG. 1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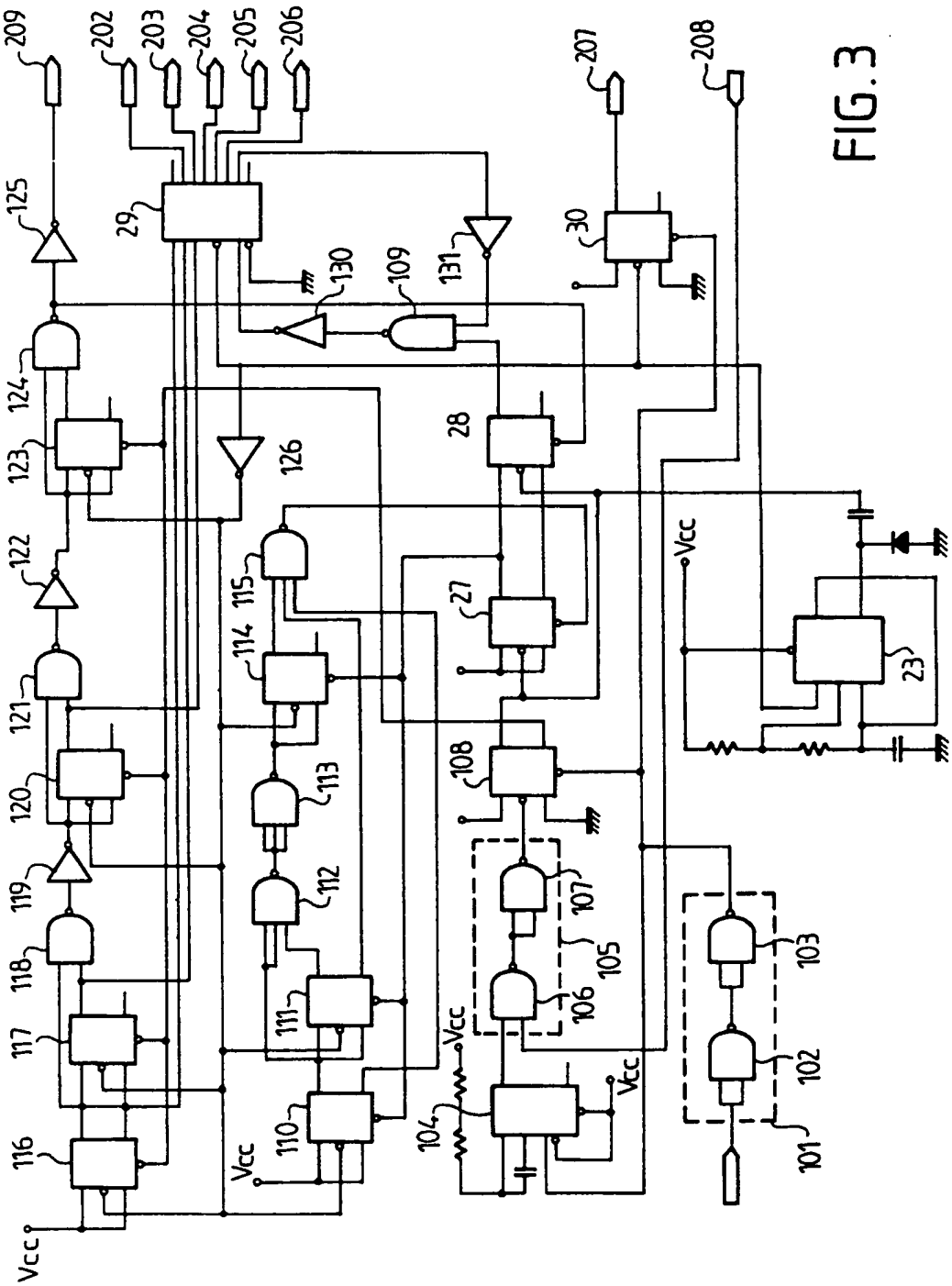
TURBO
RIGHT
CENTRE
B/W
F/W
Vcc
DRIVE LATCH
TURBO DEC
LEFT DEC
RIGHT DEC
B/W DEC
F/W DEC
CROSS-CONDUCT PROTECT
TRI 6
CLOCK DEMUX
<0.25mS FILTER
2nd ID DET.
TIMER 2
ASTABLE TIMER
ID PULSE COMPARATOR
1st ID DET.
TIMER1

FIG. 2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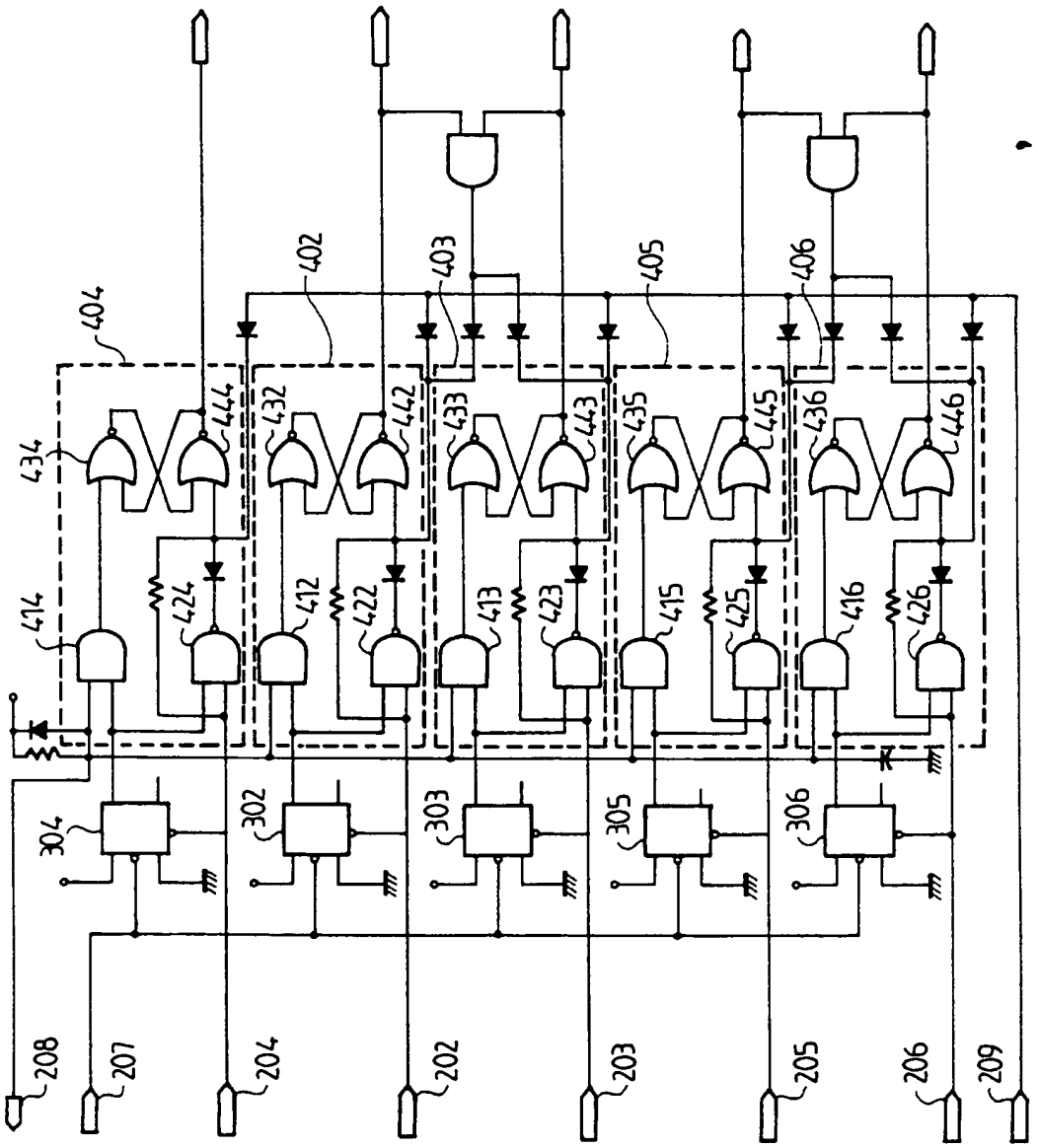
125
29
30
130
109
131
124
123
126
28
122
115
114
27
121
113
108
120
112
107
119
105
118
111
106
103
117
Vcc
102
116
110
104
101
Vcc
23
Vcc
Vcc

FIG. 3

FIG. 4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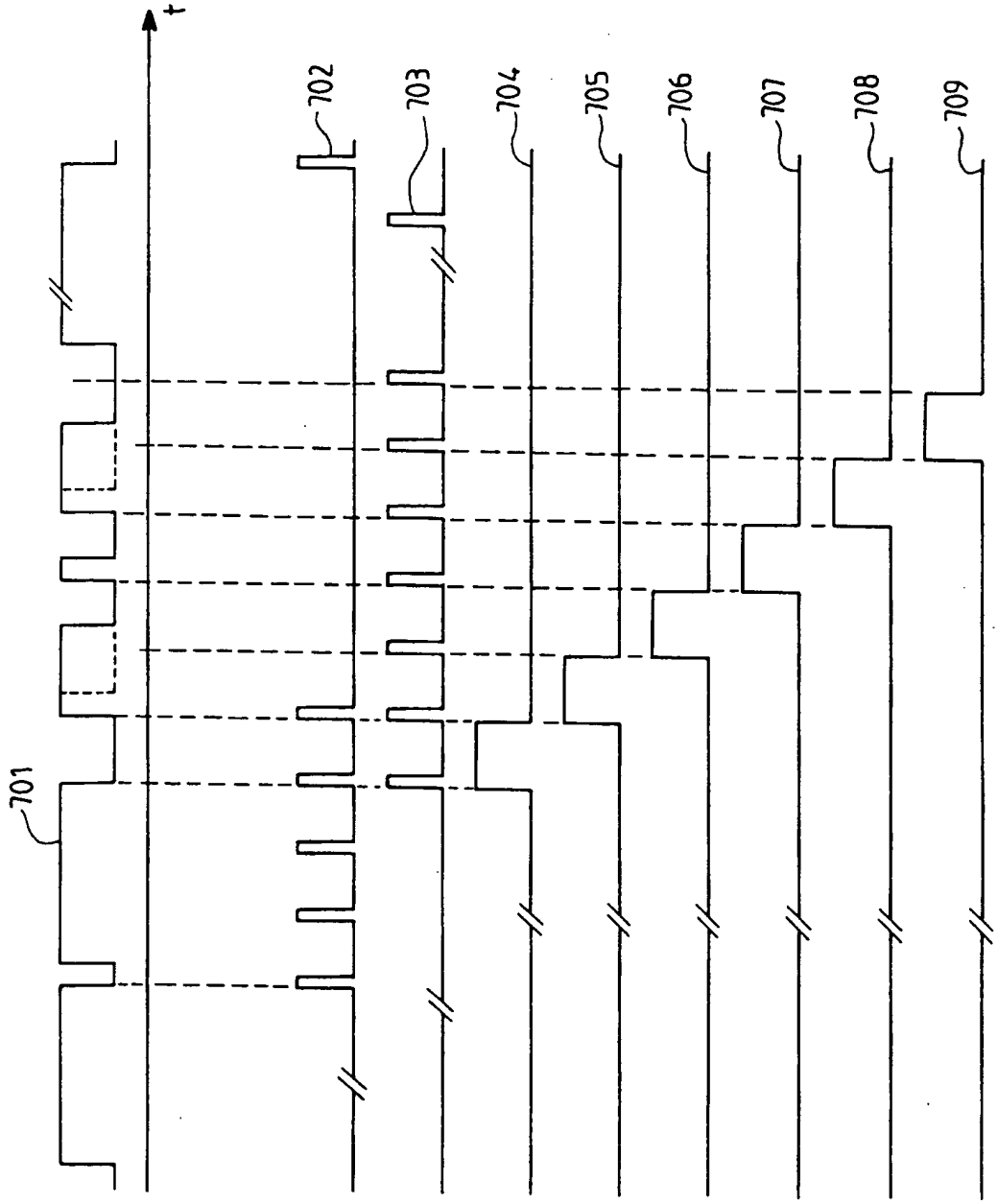
209

FIG. 5



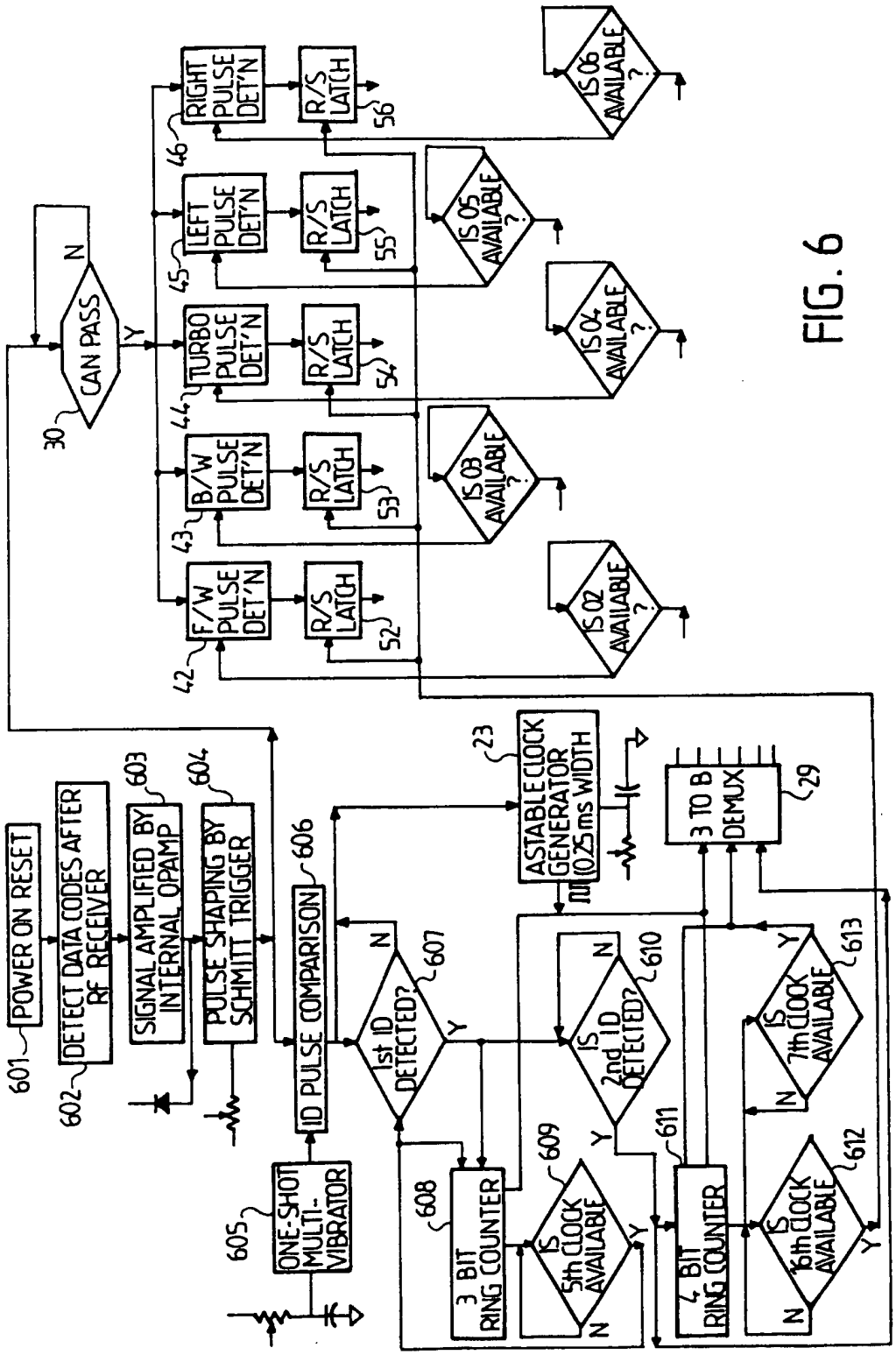

POWER ON RESET
601
DETECT DATA CODES AFTER RF RECEIVER
602
SIGNAL AMPLIFIED BY INTERNAL OPAMP
603
PULSE SHAPING BY SCHMITT TRIGGER
604
ID PULSE COMPARISON
606
ONE-SHOT MULTI-VIBRATOR
605
1st ID DETECTED?
607
3 BIT RING COUNTER
608
IS 5th CLOCK AVAILABLE
609
IS 2nd ID DETECTED?
610
4 BIT RING COUNTER
611
IS 6th CLOCK AVAILABLE
612
IS 7th CLOCK AVAILABLE
613
ASTABLE CLOCK GENERATOR 0.25ms WIDTH
23
3 TO 8 DEMUX
29
CAN PASS
30
F/W PULSE DET'N
42
B/W PULSE DET'N
43
TURBO PULSE DET'N
44
LEFT PULSE DET'N
45
RIGHT PULSE DET'N
46
R/S LATCH
52
R/S LATCH
53
R/S LATCH
54
R/S LATCH
55
R/S LATCH
56
IS 02 AVAILABLE ?
IS 03 AVAILABLE ?
IS 04 AVAILABLE ?
IS 05 AVAILABLE ?
IS 06 AVAILABLE ?
Y
N

FIG. 6